THE

current

RESEARCH AND HAPPENINGS FROM RHODE ISLAND NSF EPSCoR | SPRING 2011

Art, Design & Research

Rhode Island NSF EPSCoR
Experimental Program to Stimulate Competitive Research

current

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On the Cover:

A crinoid clinging to a branching soft coral on the S. S. Yongala shipwreck, 80 ft under water in the Great Barrier Reef Marine Park. This filter-feeding echinoderm stretches out its feathery arms to catch food particles from the water column.

Greetings From The Directors

Photo by Chris Rose

FROM DR. PETER ALFONSO

Welcome to another addition of The Current. This issue is a celebration of new relationships and exciting ideas. The articles within highlight the integration of science with art and design, and Rhode Island NSF EPSCoR's newly formed relationship with the Rhode Island School of Design.

First, we would like to announce that the University of Rhode Island was successful in their application for a new EPSCoR award. The $20 million award is the largest single grant in URI history. Our partner institutions are Brown University, the Rhode Island School of Design, Bryant University, the Community College of Rhode Island, Providence College, Rhode Island College, Roger Williams University, and Salve Regina University.

The new award has a research focus on the adaptation of marine organisms to climate change. We will continue to support infrastructure at the three Rhode Island NSF EPSCoR core research facilities in Marine Life Science, Genomics, and Proteomics. The EPSCoR Academy will continue to build student and workforce development programs across the state. The Slater Technology Fund will continue to train Entrepreneurial Fellows. Our partners at RISD and also at URI's Metcalf Institute of Marine and Environmental Reporting will look into new ways to communicate and engage the public.

As Rhode Island's Senior U.S. Senator Jack Reed said at the public announcement of our new five-year award "This research will help promote sustainable management of Narragansett Bay and could lead to new discoveries that impact Rhode Island's watermen, seafood, aquaculture, and tourism industries. This grant is a smart investment in Rhode Island that will strengthen the state's research and development competitiveness, foster economic growth, and help create jobs now and in the future."

We have now begun to build upon the successes of our first NSF EPSCoR award. The energy at our recent strategic planning event shows that it promises to be a productive five years.

The 2010 Summer Undergraduate Research Fellowship (SURF) Conference was the largest event in the program's history. Rhode Island NSF EPSCoR and NIH INBRE collaborated to support student research projects – resulting in 95 posters at the conference in August. Lieutenant Governor Elizabeth Roberts gave welcoming remarks and Vinny Browning from AMGEN gave the keynote about the importance of student experiences in research and industry.

We continue to expand our network in K-12 education. Tim Pelletier, Outreach Coordinator, is working with Mary Johnson and the First LEGO League of Rhode Island. Sara MacSorley, Project Administrator, and others are working with Loren Spears at the Tomaquag Indian Memorial Museum and Nuweetooun Education Center in Exeter. The Nuweetooun School is one of only three Native schools in the northeast.

Rhode Island NSF EPSCoR will continue to foster collaborative research in the Ocean State. Afterall, receiving this $20 million Collaborative Agreement is evidence of working together.

Rhode Island NSF EPSCoR will certainly continue to push the Ocean State to be more competitive for research funding. We could not have been successful in receiving this award without the help of many individuals throughout the state. Thank you all.

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news

Welcome. Dr. David Bogen, the Associate Provost for Academic Affairs at the Rhode Island School of Design, has become a Co-Director. He has a background in philosophy and sociology. His experience in student-centered education make him an unique addition to the scientific research project.

Kate Wilson is the new Information Technologist. She holds a B.A. in Architecture with a minor in Computer Science. A passion for travel took her to the Danish Institute for Study Abroad for an IT internship that inspired her to pursue further studies in Educational Technology.

Shelley Hazard has joined us as our Scientific Research Grants Assistant. Her diligence and past experience at the University of Rhode Island make her a valued member of the group.

Congratulations. Sara MacSorley, known to the Rhode Island NSF EPSCoR community in her previous role, was promoted to the position of Project Administrator. This is a key position with critical reporting responsibilities and duties at the national level.

Farewells. We would like to thank Dr. Andrew Staroscik for his work with The Academy. He is exploring other interests. We also thank Tyler Whittaker for his work with the North East Cyberinfrastructure Consortium and wish him well.

Mission

Our Mission is to provide a platform to promote collaboration and cooperation among Rhode Island's institutions of higher education (IHE) and to enable alignment of our efforts with the needs of the state to increase research competitiveness, especially in marine life science and affiliated sciences. We believe this will improve the employment rate, provide more attractive employment opportunities, create new businesses, and preserve and strengthen our connection to Narragansett Bay, its watersheds, Rhode Island Sound, and the Atlantic Ocean.

NSF

Vision

The vision driving us is that Rhode Island will be an international leader in understanding and predicting the response of marine organisms and marine ecosystems to climate variability. This target area aligns with the state's Science & Technology Plan, "Accelerating Innovation through Collaboration in the Ocean State." With the planned investments, Rhode Island will use molecular and cellular techniques, cyberinfrastructure, computational biology, pioneering visualization techniques, and interdisciplinary approaches to advance knowledge about the interaction of climate variability with the evolution of marine communities and their connection to the watersheds. Our community of scholars and trained workforce will contribute to understanding how human actions affect our environment. This will provide information to our colleagues in the humanities, policy, law, technology, and engineering who will craft what actions need to be taken to sustain a healthy environment.

Rhode Island NSF EPSCoR
Experimental Program to Stimulate Competitive Research

Designer in Focus: From London, England, to New England: Chris Rose

By: Sara MacSorley

Chris Rose, Pricipal Investigator, NSF STEM to STEAM
Rhode Island School of Design

Chris Rose began his education studying Industrial Design Engineering at the Central School of Art, and later at the Royal College of Art, London. After running his own design business he gradually reentered academia through teaching, academic program design and leadership, and research supervision. Today, he is internationally known and was awarded a 2010 Award of Merit by the Award Council of the International Institute for Advanced Systems Research and Cybernetics

Twenty years ago, Chris Rose got involved with the Rhode Island School of Design. It started through Furniture Design, Industrial Design, and Graduate Studies. He has "always enjoyed my various encounters with RISD because of its vitality and hugely productive and diverse creative spirit and active connections with the wider world."

Rhode Island NSF EPSCoR is now experiencing that creative spirit. The inclusion of RISD within the EPSCoR Partners presents a unique opportunity for us to visualize science and the scientific process. Chris Rose helped us start this exciting journey

"EPSCoR is an interdisciplinary consortium in which a lot more can happen than just discovering an interest in each other's work. We can discover and develop effective events and curricular ideas for a new generation of students, we can co-develop aspects of research practice that may effectively fold back into root disciplines, in addition to addressing the challenges of public engagement with science. We can begin to find ways of re-integrating our multiple faculties in understanding the natural world," says Chris Rose.

The Rhode Island NSF EPSCoR-sponsored workshops 'Making Science Visible' held in Fall 2009 and Spring 2010 embodied this partnership. Specialists from science, art, design, and education came together in a strategically designed event space. With the help of Academic Affairs and a small group of graduate students, a diverse group of faculty was brought together to explore a series of examples of cross-discipline insights, challenges, and ideas for future networking. Chris Rose specializes in "event-based teaching and learning" – addressing the challenges of communication within cross-disciplinary study – and creative workshops and classes that bring apparently separate areas of study and research into useful contact with each other.

One of his current projects is the "Breathing City" collaborative. This project is a long-range research activity that is bringing together scientists, artists, and designers sharing an interest in complex systems and issues of interpretation and meaning. They aim to create 'encounter spaces' for specialists and non-specialists alike around issues of understanding increasingly intricate data.

Most recently, Chris Rose was invited by the Royal Society of Science (U.K.) to participate in their 350th anniversary events with their large scale "Ice-Traffic" installation – a combination of light, sound, and scientific data. "Children loved it. Scientists discussed it. Families speculated around it. All of us had the chance to consider and reflect all that it connected to, both there in that space and in the world as a whole," he said.

"If we are to seek some clues as to how to connect specialist disciplines…there is much to be learnt from… the ways in which the various human senses we have work together and constitute what we call knowledge. Ideas of a 'common language' are intriguing but elusive where highly specialized language and jargon are

"We can begin to find ways of re-integrating our multiple faculties in understanding the natural world."

Photo by Chris Rose

features of challenging work in differing yet associated domains. 'Shared strategies' is probably a more useful concept. We live in a time of unprecedented opportunity to do this; but that's not to say it will happen without employing new and emergent techniques, appropriate to what is now available."

Connecting design thinking to scientific research can provide a new method to approach complex problems. According to Chris Rose, "A good designer is the person who puts it all together after talking with all the different people necessary in a complex activity that cannot be done entirely by one person. In other words they are capable of resolving apparently conflicting information into a materialized idea that people say 'Yes' to." Putting together all the pieces with the increasing complexity of scientific data and collaborative relationships, RISD's contribution will not only be engaging for Rhode Island NSF EPSCoR participants, but also a tangible step toward success.

When asked about whether or not he would continue his work with RISD, Rose replied, "When I first came to RISD I thought it was a one-off visit for one semester. That was twenty years ago so I guess the answer is yes."

explainer

Photo by Chris Rose

WHAT IS DESIGN THINKING?

"I think design thinking is an inherently optimistic way to approach the world" – Lindsay Kinkade (page 11).

"Design thinking involves a willingness to critique our conception of 'the big picture' and how this may be communicated, disassembled or re-envisaged. It involves an unpredictable array of seemingly unconnected activities…and above all it involves the deliberate employment of multiple means of investigation, portrayal, and exploratory communication in order to engage with each of our many intelligences. Finally it involves the emergence of brilliant ideas in a context that people can relate to even if they hadn't previously predicted it!" – Chris Rose (page 04).

Design thinking is a process to find creative solutions and discover new opportunities. It is a way of thinking that maximizes observations, limits judgments, and seeks balance. The idea is to build from a variety of perspectives – it's multidisciplinary.

Many fields including science, art, and business can implement design thinking. It can be used to solve problems, make improvements, organize ideas, and create knowledge. Design thinking is creative, collaborative, personal, experimental, and integrative.

First, the right problem must be defined. Design thinking requires applying multiple perspectives and asking questions to frame the problem in such a way that creative solutions are encouraged. The ability to do this requires limited judgment and an open-minded, inviting environment.

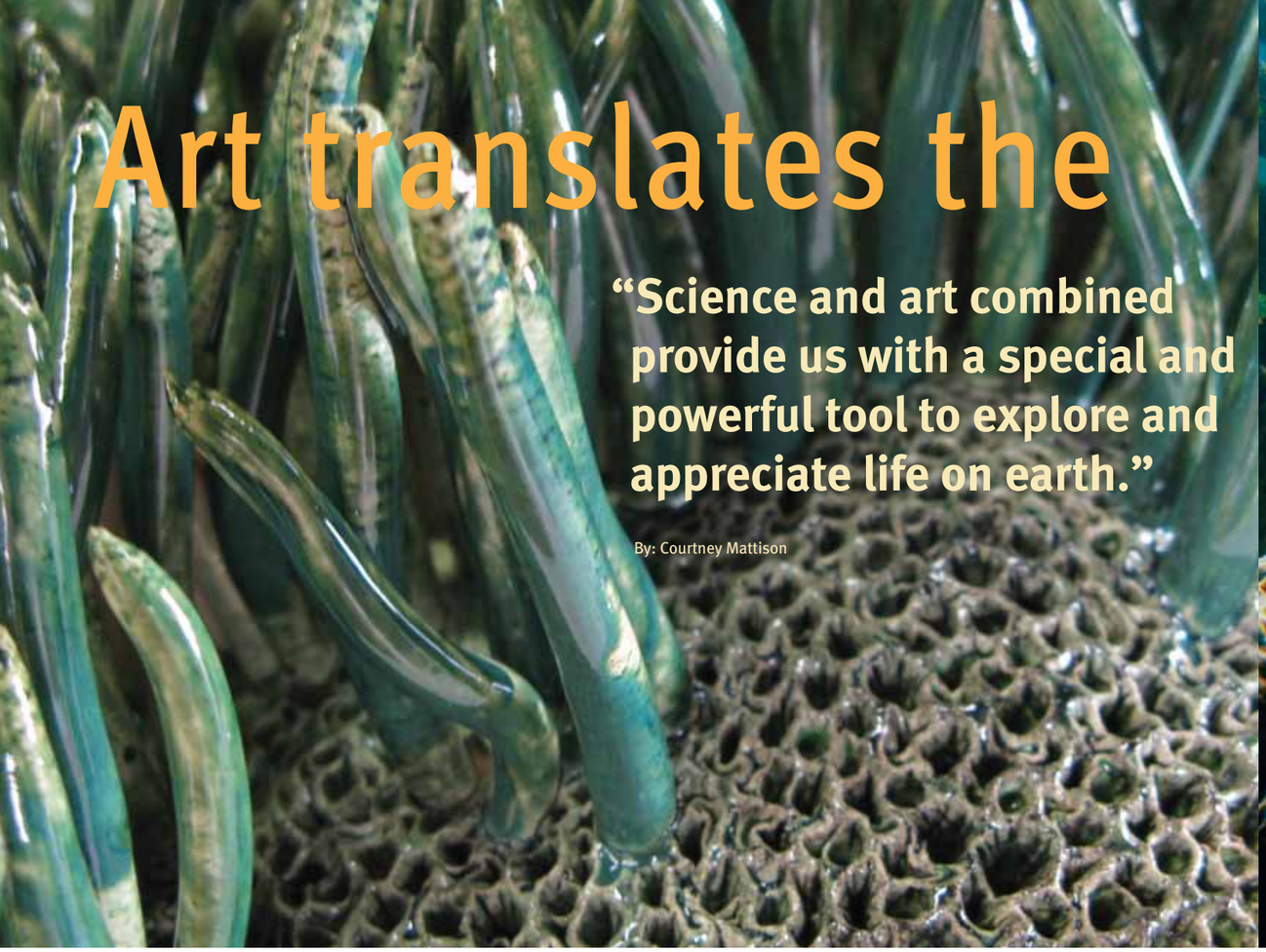
Multiple perspectives and open minds will lead to many options. All options should be considered and new opportunities may surface in the process. The team can then work together to identify the best options and execute them.

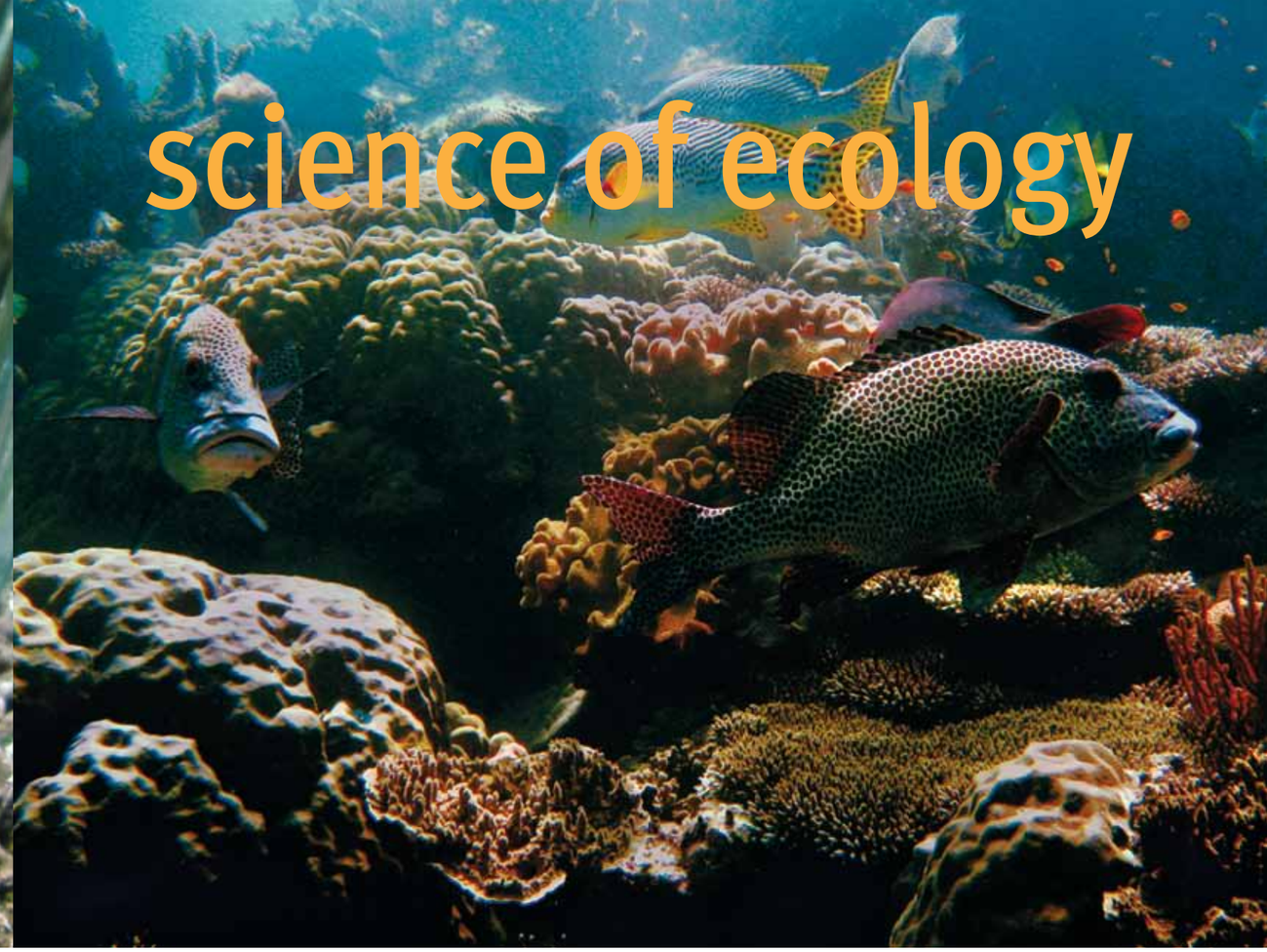
Rhode Island NSF EPSCoR is going to work with RISD to incorporate design thinking into aspects of research, education, and public engagement.

Art translates the science of ecology

"Science and art combined provide us with a special and powerful tool to explore and appreciate life on earth."

By: Courtney Mattison





Photos by Courtney Mattison

The scientific world is distant from main stream culture. Scientists struggle to present their findings to laypeople whose eyes glaze over at the sight of a quantitative model or graph. Consequently, scientists find it challenging to express the complexity and urgency of phenomena such as global climate change, ocean acidification, and species extinction to people with neither scientific literacy nor a strong interest in the natural world. Diagrams, models, and illustrations help communicate concepts to a visually oriented public. Thus, art provides a crucial tool in the dissemination of scientific findings.

The problem is that art and science "have proceeded on parallel and wholly divergent paths" since the days of Leonardo da Vinci – master painter and brilliant scientist.[1] Scientists have restricted themselves to a world of knowledge built on observation and logical thought, whereas artists have explored limits by rebelling from predictable rules and restrictions. While these two paths seem dissimilar, they actually share a great deal.

Science and art both stem from curiosity about mysterious natural forces and forms. Both fields explore natural phenomena and require high levels of curiosity, persistence, and motivation to develop the novel ideas, experiments, technology, and conclusions necessary for their respective pursuits.

Not only do science and art share similar ambitions, they are co-dependent. Science and art inform one another. Scientific findings rely on artistic renderings to communicate vital concepts (like climate change and species extinction) to the public. Simultaneously, art depends on science for new technologies and inspiration. Science and art are more valuable together than they are separate, for without art, "When you understand all about the sun and all about the atmosphere and all about the rotation of the earth, you may still miss the radiance of the sunset."[2] Sure, we can understand how global climate change warms tropical oceans or how carbonic acid dissociates to acidify seawater, but none of that knowledge will stimulate reform unless art illuminates our emotional ties to the problem:

> Science can change the water chemistry, but…it is art and history, combined with the science, that will ultimately change people's minds – will change the way we think about an industrial economy that is destroying the very ecosystems that sustain us, and all life.[3]

Science and art combined provide us with a special and powerful tool to explore and appreciate life on earth.

As art is an effective liaison between science and the public, we can implement it to effect change:

> As the 21st Century unfolds, we urgently need a more constructive relationship between our species and the natural world. We can no longer afford the vacationer's emphasis on art for art's sake. The new catch phrase may actually be: Art has a job to do.[4]

Time is running out for the ecosystems that inspired so many of the scientists and artists of the past to explore and venerate the wonders of the natural world. Now it is time to use science and art for a higher purpose. However, says curator Lucy Lippard:

> There is no reason to exaggerate the elusive power of art. Artists cannot change the world…alone. But when they make a concerted effort, they collaborate with life itself. Working with and between other disciplines and audiences, and given the chance to be seriously considered outside the rather narrow world of art, they can offer visual jolts and subtle nudges to conventional knowledge…At best they can make the hot breath of climate change both vivid and immediate to this visually oriented society, and they can inform us in the process."[5]

We anticipate that the collaboration of scientists with artists and designers will make a difference in the public eye.

Photo by Courtney Mattison

Of course, we must be careful. If art is to promote sustainability or deter climate change, if these topics "become art trends du jour, we risk providing a palliative to ourselves and to our audiences without contributing much to artistic production, nuanced debate, or lasting social change."[6] Through thoughtful, passionate, and inclusive collaborations between the arts and sciences, people of every discipline may relate and unite to repair and conserve the global ecosystem.

I cannot help but to explore the miraculous complexities and inherent beauty of marine organisms. As a visual learner, I document each of my experiences photographically, and later sculpturally, to better understand what I observe. I often look to nature for artistic inspiration, and my appreciation for the beauty of the environment motivates me to learn more about the creatures that shape it. The physiology and behavior of living organisms provide myriad paths for both scientific and artistic exploration. I strive to celebrate the beauty of living organisms, but to do so I must understand their inner workings from a biological standpoint. Through physiological and behavioral studies concentrating on marine invertebrates, I gain artistic inspiration and have learned to view sculpture from a scientific perspective.

[1] S. Austerlitz, "Getting art and science to talk to each other," San Francisco Chronicle, November 30, 2007.
[2] A. N. Whitehead, Science and the Modern World. (Free Press, 1997).
[3] E. Reece, 57.
[4] E. Reece, 56.
[5] L. R. Lippard, in Weather Report: Art and Climate Change. (Boulder Museum of Contemporary Art, Boulder, CO, 2007), pp. 6.
[6] S. Smith, in Weather Report: Art and Climate Change. (Boulder Museum of Contemporary Art, Boulder, CO, 2007), pp. 13.

Photo by Courtney Mattison

There is an urgent need for humanity to understand the beauty and importance of coral reef ecosystems if it is to protect them. My sculptural explorations heighten my appreciation for the biological subjects that stimulate my creativity, while my education in biology has guided and inspired my sculpture.

Courtney Mattison is currently creating a large-scale ceramic coral reef installation as her Master's thesis at Brown University, which aims to use art to inspire coral reef conservation and policy change. With sponsorship from NOAA, this piece will debut in the lobby of the Department of Commerce Herbert C. Hoover Building in Washington DC from 15 April-15 June, 2011.

Learn more at www.courtneymattison.com

Rhode Island Streams Project: Training The Next Field Scientists

By: Sara MacSorley

Rhode Island is working with Vermont, Delaware, Maine, and New Hampshire to expose the next generation of field scientists to research in watershed ecology.

Photo by Tyler Whittaker

The Vermont Streams Project provided a high school teacher and three of her students (pictured) with a week of training in stream ecology, sampling techniques, site and habitat assessment in the field, statistics, and data analysis. Dr. Philip Veillette and Tyler Whittaker from Rhode Island NSF EPSCoR also attended. This training provided excellent hands-on experience in the field and in the lab. The skills and curiosity are now being transferred to classrooms and being applied to streams and ponds in Rhode Island.

Dale Dearnley teaches 9th grade physics, 11/12th grade environmental science, and runs an after school science club at Central Falls High School. As part of the Rhode Island Streams Project, Ms. Dearnley and her students are monitoring two Providence area streams. They received supplies for stream-sampling from Rhode Island NSF EPSCoR. Each stream was categorized over the summer – one is relatively clean while the other is in a more urban area and likely polluted. Macroinvertabrates from each stream were collected and the students are analyzing those samples during the school year.

Students test the dissolved oxygen content of the water from each stream and collect water samples for additional analysis as part of new collaborations. With the help of the Rhode Island Department of Health, students are measuring bacterial content – an indicator of sewage contamination. Through the Rhode Island Watershed Watch at the University of Rhode Island, they are also measuring phosphorus levels and turbidity.

The training in Vermont will directly impact approximately 25 high school students through the science club. The projects will impact more students through the use of the collected data in the environmental science curriculum. The student-group who attended the initial training will return to Vermont in the spring to present the results from their class project at the Streams Project Annual Symposium.

Photo by Tyler Whittaker

A Meeting of Strategic Minds: The Rhode Island NSF EPSCoR Community

It started with just the mission and vision posted and it grew to a visualization of the entire Rhode Island NSF EPSCoR operation.

Photos by Emily Sara Wilson

The first strategic planning meeting of the Rhode Island NSF EPSCoR Cooperative Agreement started with Associate Project Director Dr. Jennifer Specker addressing the working group. “This is an experiment, and we are experimentalists,” she began, and from that moment, the event proved to be creative and innovative.

The Rhode Island NSF EPSCoR office wanted to have a strategic planning event that would be both effective and fun. The new award incorporates the visualization of science; so, why not visualize the strategic planning process, too? Facilitator, Mary Jo Kaplan (Kaplan Consulting) and two graduate students, Emily Sara Wilson and Jane Androski from the Rhode Island School of Design made this happen over the course of the two-day event held at Brown University in October 2010.

The session on research infrastructure, for example, began with a large map of Rhode Island on the wall – only the partner institutions were labeled. Each table was given lists of the proposed equipment in the new award. It was the workgroup’s job to put up the pieces and fill in the blanks of what already existed. This preliminary inventory led to the common idea that it would be a great resource to have available online.

The Cyberinfrastructure session added on to the equipment mapping. Alison Ferreira of OSHEAN drew in the fiber that will be laid by the incoming cyber grants to the state. Dr. Jan Hesthaven of Brown University’s Center of Computation and Visualization spoke about the challenges of transporting and storing large data sets. Other special guests included Dr. Jan Hesthaven of Brown University’s Center for Computation and Visualization, Dr. Garry Bozylinsky, Chief Information Officer at the University of Rhode Island, and Dr. Rebeka Merson from Rhode Island College.

Throughout the meeting, notes and ideas were added to a large visual map on the wall. It started with just the mission and vision posted, and it grew to a visual of the entire Rhode Island NSF EPSCoR operation. Participants were encouraged to add to the map with the Rhode Island School of Design students leading the way.

During the statewide alignment session, representatives from state government, business, and education were intrigued. The maps and diagrams helped lead to a vibrant discussion about our activities and new ideas for collaboration, student involvement, and the capacity for making science visible.

The room maintained an enthusiastic, proactive energy while discussing tough topics like evaluation and sustainability. Even with the hurdles ahead, everyone was ready to get to work. John Dunnigan from the Rhode Island School of Design summed it up best when he calmly said, “I see challenges as opportunities.”

spotlight

Lindsay Kinkade, Director of Communications for Rhode Island NSF EPSCoR at RISD

Lindsay Kinkade has lived all over the country and now calls Providence, Rhode Island home.

Lindsay Kinkade, in a box.

Photos by Lindsay Kinkade

One recent project involves creating colorful steps for public spaces. The steps are mobile and the design of the space is made to change based on the ideas of the people currently in the space. The entire set up becomes a new space for new community exchange.

After undergraduate study in journalism and political science at the University of North Carolina at Chapel Hill, Kinkade embarked on a seven year career at The Boston Globe. She worked on design projects ranging from the front page to arts sections to science graphics. This work piqued her interest in community communication. “The newspaper was a very effective way of initiating community dialogue…I wanted to learn the set of skills and processes I would need so that I could design anything.”

What better place to do that than the Rhode Island School of Design?

Her thesis work at RISD researched “community-based inquiry” – creative ways to start exchange systems in a community context. Her work looks at new places for exchange by inviting community members into conversation, adapting reusable materials, and setting up physical and virtual spaces for new interactions. Kinkade has used her expertise to work on EPSCoR public engagement activities including the Making Science Visible initiative (page 04). “EPSCoR presents a unique opportunity for interdisciplinary collaboration. My work is aimed at making that collaboration easier, richer, and public.” Collaboration is a key concept because as Kinkade says, “the combined knowledge and work of a group, can be more powerful than the work of any one person.”

The Making Science Visible event showcased several of Kinkade’s community exchange projects. Posters highlighting design projects relating to science were visible and created a conversation starter for the attendees from many disciplines – art, design, science, outreach and more! Attendees were also given notebooks to write down their thoughts and ideas from the event as they were being experienced. The design of both the posters and notebooks themselves were made to inspire new ways of thinking and interacting.

Kinkade’s goal is to reach wide audiences and to share information in a generous and empowering way. That is exactly what she is helping EPSCoR do with their activities. This is also part of how she defines education. She encourages all young people to engage in self-guided discovery – which can lead to a career in art, science, or something in between.

Rhode Island is lucky enough to have Kinkade and her inherently optimistic attitude as part of it’s community. She plans to continue pursuing projects to explore community-building, interdisciplinary learning, and social good. She has started a community-based design studio, Little Giant (lindsaykinkade.com). “Being able to respond to what comes and to invent my own future is how this all started. I’m inventing it a little at a time.”

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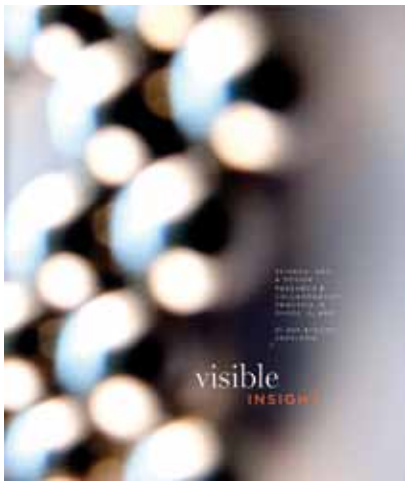

Visible Insight
A new book published by RISD documents their initial efforts "in building meaningful, sustainable research collaborations between artists, designers, scientists, and educators." Download now at riepscor.org.

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